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(54) Personal radio system

(57) A personal radio system includes a remote controlled headset (10) for receiving radio transmissions and for providing audio output corresponding to the radio transmissions to a user; and a remote control unit (12) operated by the user for operating the headset from no more than a predetermined distance. The user therefore has a conveniently operated radio system which does not produce interference between the remote control unit and an additional remote controlled headset associated with another user.

The remote control unit (12) is wrist-mountable, and may be built into a wrist-watch or attached to its strap, and has two push-buttons (60,62) short or long duration actuation of either or both of which selects an infra-red coded command to be sent to the headset (10) which also gives an aural indication of the command via a voice synthesizer.

The control unit may instead be built into the headset.

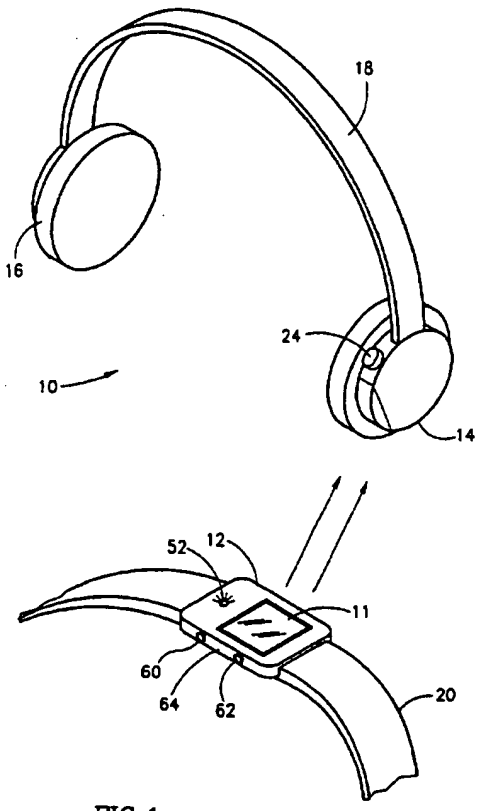

FIG.1

GB 2 316 788 A

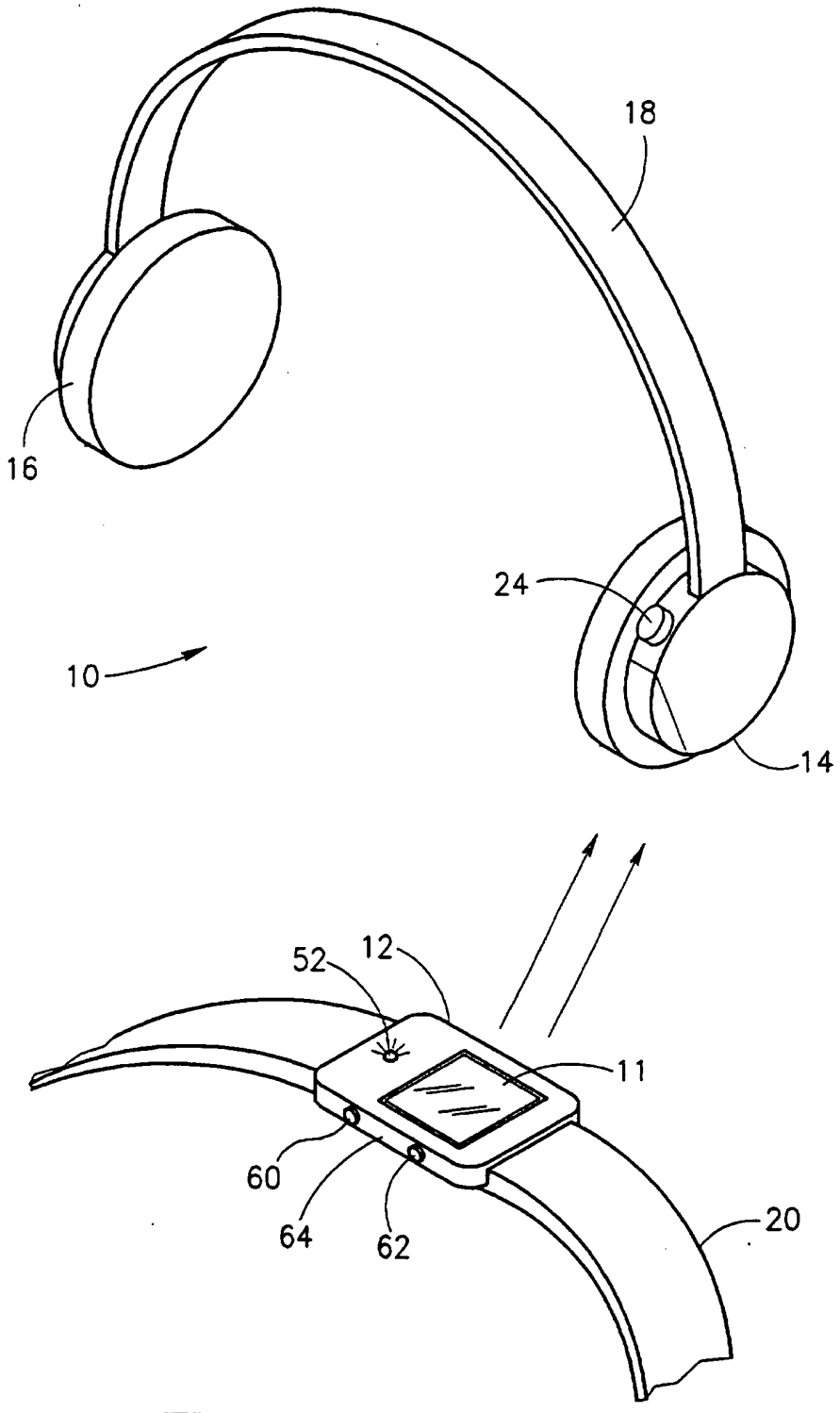

FIG.1

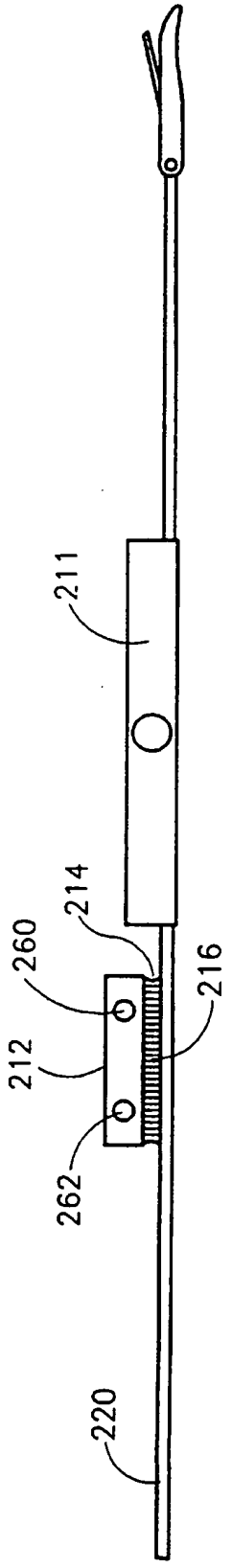

FIG.2

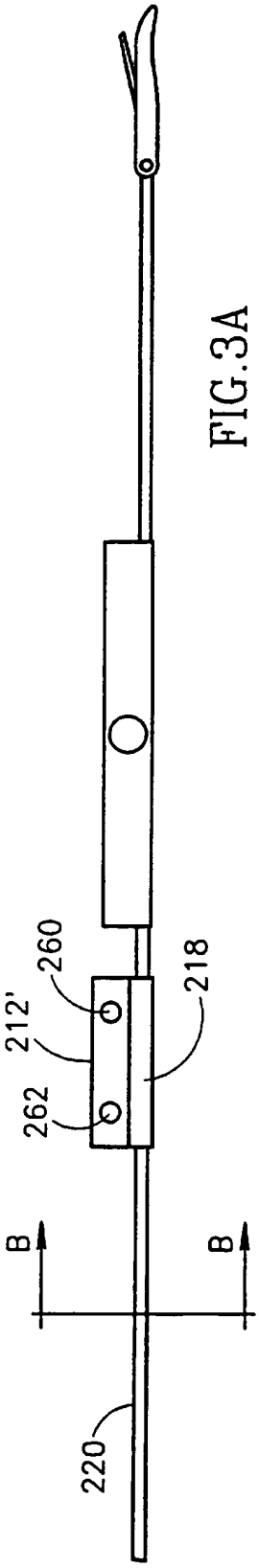

FIG.3A

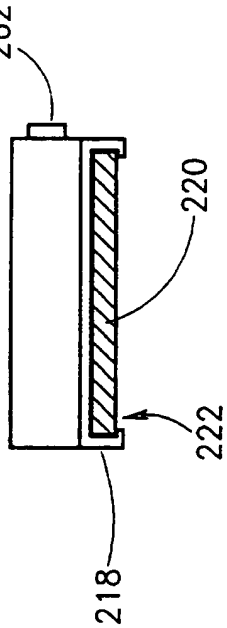

FIG.3B

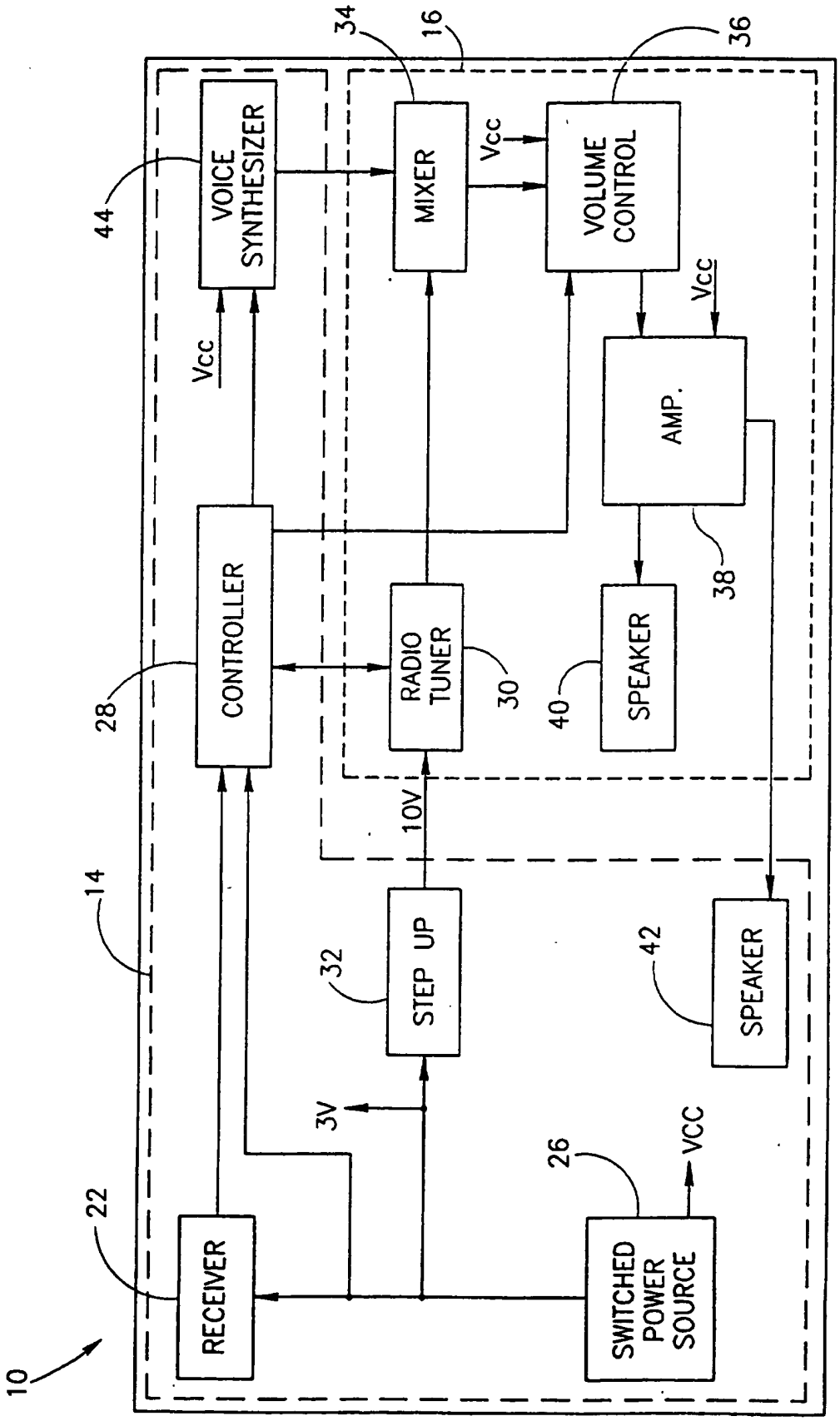
10
14
16
22
26
28
30
32
34
36
38
40
42
44
RECEIVER
SWITCHED POWER SOURCE
CONTROLLER
RADIO TUNER
STEP UP
MIXER
VOLUME CONTROL
AMP.
VOICE SYNTHESIZER
SPEAKER
SPEAKER
Vcc
Vcc
Vcc
VCC
10V
3V

FIG.4

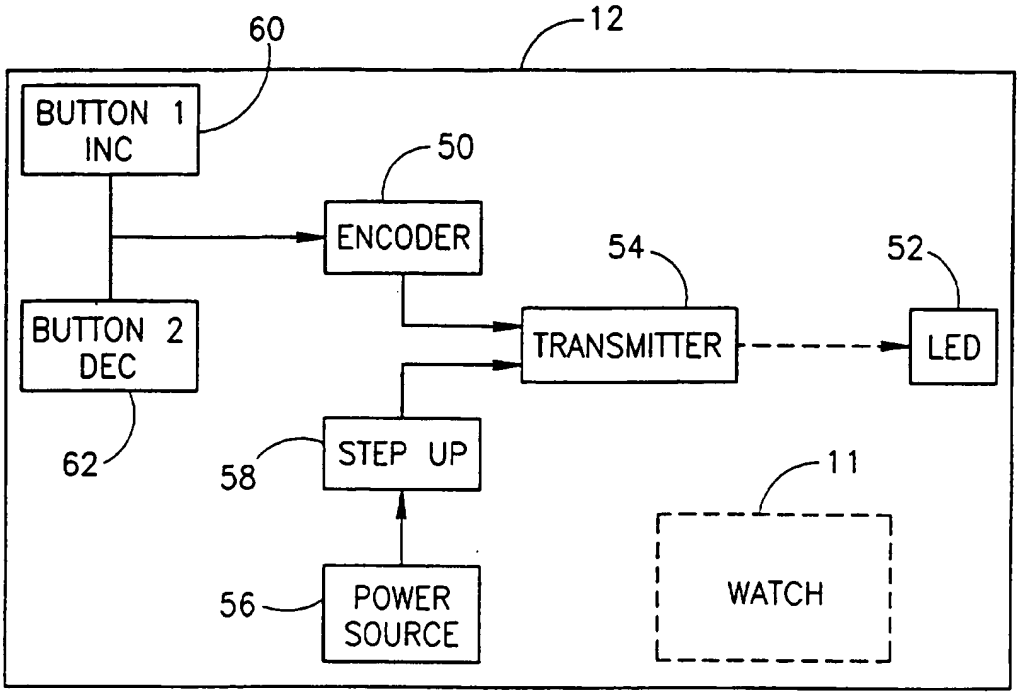
60
12
BUTTON 1
INC
50
ENCODER
54
52
BUTTON 2
DEC
TRANSMITTER
LED
62
58
STEP UP
11
WATCH
56
POWER
SOURCE

FIG.5

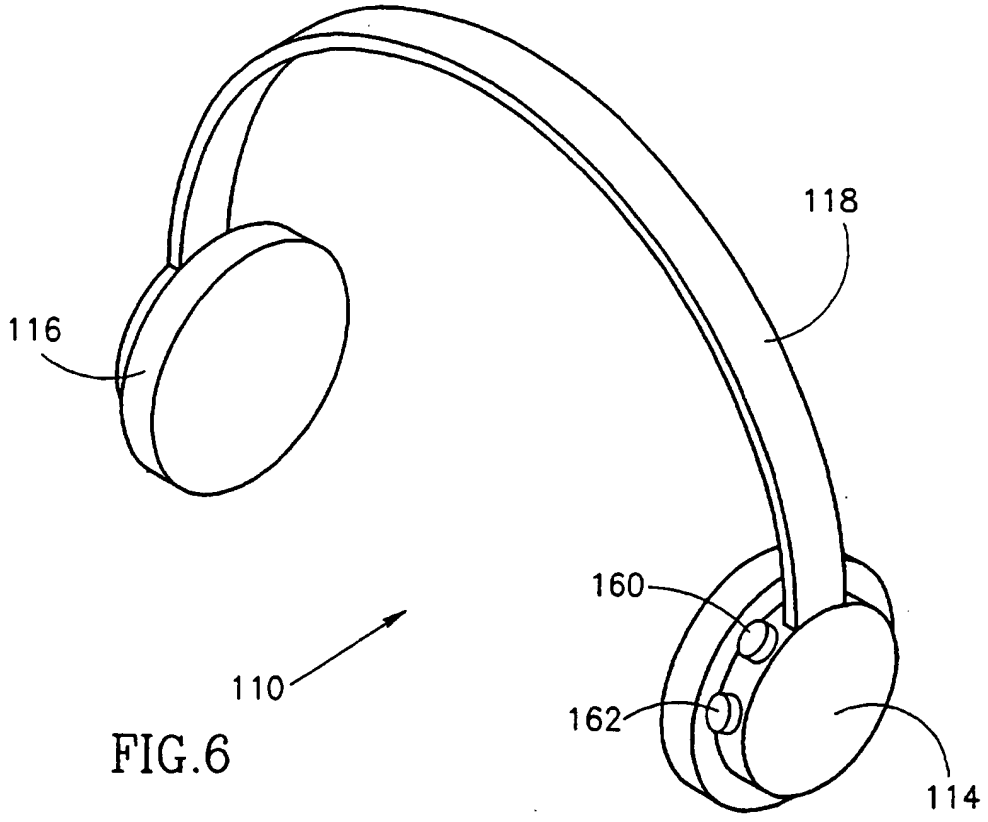
118
116
160
110
162
114

FIG.6

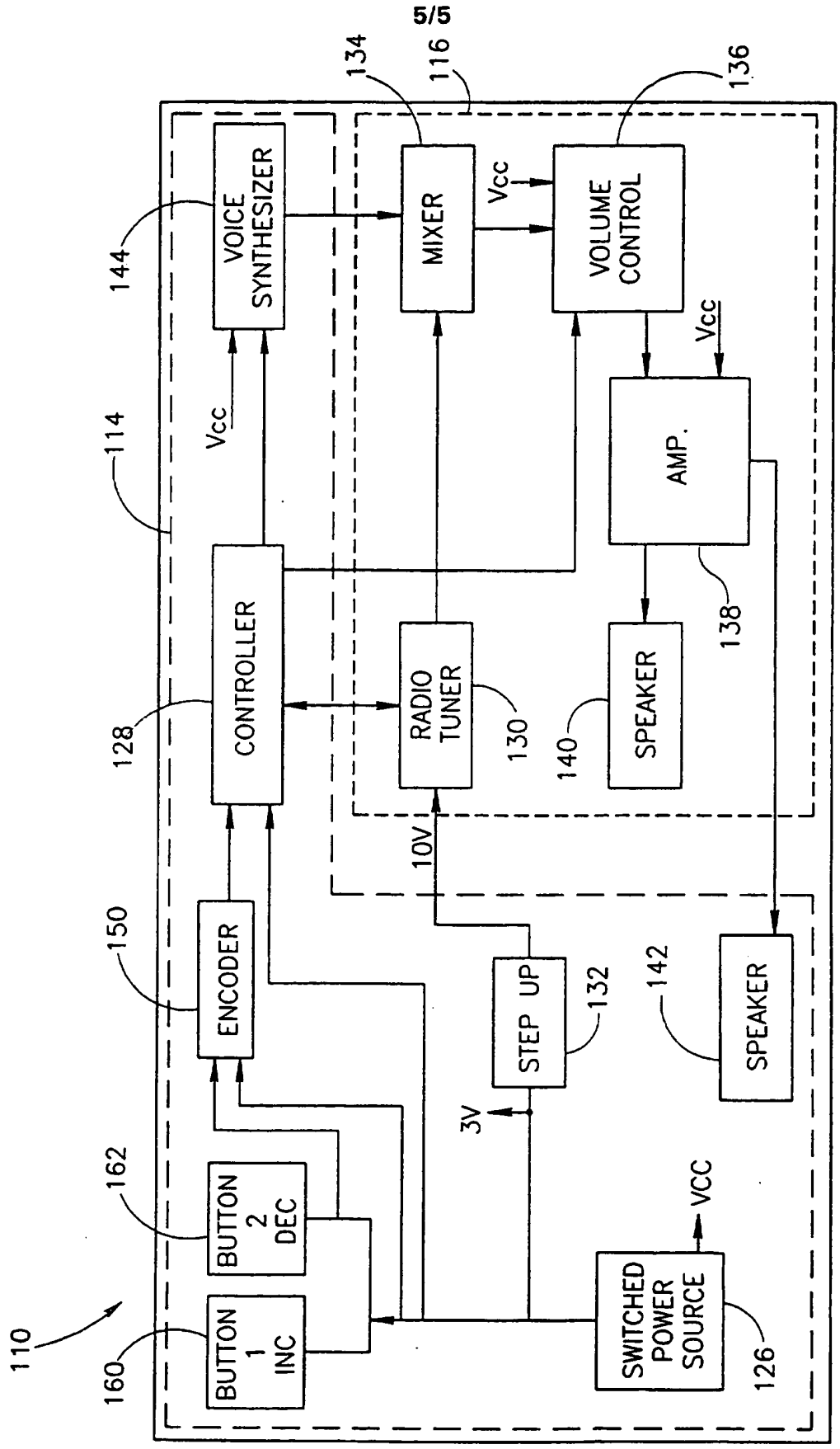
110
160
BUTTON 1 INC
162
BUTTON 2 DEC
150
ENCODER
128
CONTROLLER
114
144
VOICE SYNTHESIZER
Vcc
134
MIXER
116
Vcc
136
VOLUME CONTROL
Vcc
AMP.
138
130
RADIO TUNER
140
SPEAKER
10V
STEP UP
132
3V
142
SPEAKER
SWITCHED POWER SOURCE
VCC
126

FIG.7

PERSONAL RADIO SYSTEM

The present invention relates to communications systems generally, and to personal radio systems in particular.

Radio systems, since their inception, have included three basic portions, namely, a tuner, a control panel including controls and a visual display, and a speaker system. While the control and display may be either analog or digital, and the speaker system may be either mono- or stereo, the basic radio system has remained substantially unchanged.

Personal radio systems, each comprising a tuner unit and head- or earphones, are available in various shapes and sizes. As with many areas of electronics, it has been sought to miniaturize personal radio systems such that, rather than the control unit being separate from the earphones, and attached thereto by a wire, the control unit is formed as an integral part of the earphones, thereby to provide a highly compact system.

Although the above compact radio system is constructed for maximum utility, as the basic radio system outlined above, it still retains a plurality of controls, in some cases including a predetermined number, normally six, keys via which stations may be programmed, and a visual display.

Accordingly, use of such a system requires removal thereof from the head so as to enable visual inspection of the display and thereby to determine the tuned frequency at any time, and memorizing of the positions and functions of the various keys by which the compact radio system is controlled.

It will be appreciated that a compact personal system such as described above is not only inconvenient, in as far as it cannot be tuned to a selected non-programmed frequency while wearing it, but also requires either an external or internal light source so as to view the display. Furthermore, it is thus not tunable to a selected non-programmed frequency by a blind person.

In an attempt to improve the utility of personal radio systems such as described above, ARMITRON INC., of New York, USA, introduced into the marketplace a radio system having a control panel incorporated into a wristwatch. In this product, the control panel is connected to and controls operation of a headset. Among disadvantages of this system, however, are the fact that, like many other "wired" systems, the presence of the

wire limits the freedom of movement of the user, thereby rendering the system cumbersome and impractical.

It is an aim of the present invention to provide a head-worn personal radio system which overcomes disadvantages of known art, *inter alia*, by being fully operational when mounted on a user's head, and by not requiring memorizing of the different positions of a large number of control keys to operate it.

There is thus provided, in accordance with a preferred embodiment of the invention, a personal radio system which includes a remote controlled headset for receiving radio transmissions and for providing audio output corresponding to the radio transmissions to a user; and a remote control unit operated by the user for operating the headset from no more than a predetermined distance, thereby to prevent interference between the remote control unit and an additional remote controlled headset associated with an additional user.

Additionally in accordance with a preferred embodiment of the invention, there is provided a signal transmitter for transmitting operating signals from the remote control unit to the headset from no more than a predetermined maximum transmission range, thereby to prevent interference between the remote control unit and an additional remote controlled headset associated with an additional user.

Further in accordance with a preferred embodiment of the invention, the headset includes apparatus for detecting radio transmissions and for converting the transmissions into audio output; and apparatus for providing the audio output to the user.

Additionally in accordance with a preferred embodiment of the invention, the remote control unit further includes apparatus for manually selecting predetermined operational functions of the headset, and the operating signals correspond to the selected operational functions. Furthermore, the headset further includes a signal detector for detecting the operating signals, and for operating the headset in accordance therewith.

Further in accordance with a preferred embodiment of the invention, the signal transmitter is an IR transmitter, and the signal detector is an IR detector.

Additionally in accordance with a preferred embodiment of the invention, the apparatus for manually selecting includes key apparatus, having no more than a predetermined number of keys, preferably two, which are engageable in any of a plurality of

combinations for any of a plurality of time durations so as to provide a corresponding plurality of signal outputs; and an encoder, associated with the key apparatus, including apparatus for receiving the signal outputs and for operating the signal transmission apparatus to provide the operating signals in accordance with the signal outputs.

Further in accordance with a preferred embodiment of the invention, the headset also includes apparatus for providing aural indications to the user, indicative of the status of any of a predetermined plurality of user-initiated functions of the headset.

In accordance with an alternative embodiment of the invention, there is provided a personal radio system which includes radio tuner apparatus for detecting radio transmissions and for converting the transmissions into audio output; audio apparatus for providing the audio output to a user; aural apparatus for providing aural indications as to user-initiated changes in the operational status of at least the radio tuner apparatus; controller apparatus for operating the radio tuner apparatus, the audio apparatus and the aural apparatus; and operating apparatus for providing control signals to the controller apparatus for operation of the tuner apparatus, the audio apparatus and the aural apparatus.

Additionally in accordance with a preferred embodiment of the invention, the operating apparatus includes key-operated apparatus, similar to that described above, wherein the keys are engageable in any of a plurality of selectable predetermined combinations for any of a plurality of selectable predetermined time durations so as to provide a corresponding predetermined plurality of signal outputs, corresponding to a plurality of selectable, predetermined control signals.

Preferably, there is provided a headset-shaped support for the tuner apparatus, the audio apparatus, the aural apparatus and the controller apparatus.

In accordance with one embodiment of the invention, the key-operated apparatus is also mounted onto the headset, so as to be operable without requiring removal of the headset from the head of the user.

Alternatively, however, the key-operated apparatus is mounted onto a remote control unit in operative association with a signal transmitter, and the headset further includes signal detection apparatus, mounted in operative association with the controller apparatus, for detecting signals from the signal transmitter.

The present invention will be more fully understood and appreciated from the following detailed description taken in conjunction with the drawings, in which:

Fig. 1 is a diagrammatic representation of a personal radio system, constructed and operative in accordance with a preferred embodiment of the invention, and having a radio receiver headset and a remote control unit therefor;

Fig. 2 is a schematic side view of the remote control unit of Fig. 1, but configured as a separate, add-on unit, in accordance with one embodiment of the invention;

Fig. 3A is a schematic side view, similar to Fig. 2, but showing the remote control unit in accordance with a further embodiment of the invention;

Fig. 3B is a sectional view of the apparatus of Fig. 3A, taken along line B-B therein;

Fig. 4 is a block diagram representation of the radio receiver headset of Fig. 1;

Fig. 5 is a block diagram representation of the remote control unit of Fig. 1;

Fig. 6 is a diagrammatic representation of a personal radio system, constructed and operative in accordance with an alternative embodiment of the invention, and having an integrated radio receiver and control headset; and

Fig. 7 is a block diagram representation of the integrated headset of Fig. 6.

Referring initially to Fig. 1, there is provided, in accordance with a preferred embodiment of the present invention, a personal radio system formed of two basic sub-systems, namely, a radio receiver headset, referenced generally 10, and a remote control unit therefor, referenced 12.

As will become apparent from the following description, the personal radio system of the embodiment permits complete functional operation from a remote control unit, thereby not requiring removal of the headset from the head of a wearer in order to change waveband, seek and program stations, adjust volume, and the like. In this way, the present system completely overcomes disadvantages inherent in existing personal radio systems of the "wired" type. Furthermore, as the unit does not require any form of visual display indicating user-initiated change in the status of various functions of the radio receiver, these being provided instead by aural indications, no light source - either internal or external of the system - is required, and the system is further completely suited for use by blind people as well as by sighted people in its preferred embodiment.

Headset 10 typically comprises a pair of earphones 14 and 16, each of which houses various portions of the radio receiver system. The earphones are connected to each other via any suitable resilient bridging member, shown schematically at 18. The illustrated distribution of the system components between the two earphones is for convenience only, and there may also be a headset in which the component distribution between the earphones is different from that illustrated, including one in which only a single earphone is provided, and which may be mounted onto the head of a user by means of a support member similar to bridging member 18.

Remote control unit 12 is typically a wrist-mountable unit, such as shown schematically in Fig. 1, and is mounted onto the wrist of a user in watch-type fashion as by a strap 20. In accordance with a preferred embodiment of the invention, remote control unit 12 may be combined so as to include a wristwatch 11, thereby obviating the need to wear or carry remote control unit 12 and a wristwatch as separate articles.

Referring now briefly to Figs. 2-3B, it is seen that, in accordance with an alternative embodiment of the invention, there may be provided a remote control unit for headset 10, which is formed as a totally independent "add-on" unit.

By way of example, it is seen that, in the embodiment of Fig. 2, remote control unit 212 may be fastened to a strap 220 of a wristwatch 211 by a suitable hook-and-pile

fastening system, such as Velcro™. This type of system includes a hook portion 214 which is glued or otherwise attached to the base of remote control unit 212, and which is selectably fastenable to a pile portion 216, which is similarly glued or otherwise attached to the watch strap 220.

As an alternative, and as seen in Figs. 3A and 3B, the casing of remote control unit 212' may be formed so as to have a generally rectangular, hollow base portion 218, which defines an opening 222 space via which a watch strap 220 can be threaded.

It will be appreciated from the description below that, the provision of remote control unit 12 as a unit that is wrist-mountable, either directly, as in Fig. 1, or indirectly, as in Figs. 2-3B, is particularly suitable. This is due to the fact that control commands are transmitted from the remote control unit to the headset 10 by infrared (IR) signals along a line of sight therebetween. Furthermore, as opposed to systems in other technological fields which employ remote control, in the present invention it is particularly desired to *minimize* the transmission range of the remote control unit so as to avoid possible interference between the remote control unit of one system and the headset of another system nearby.

In an alternative embodiment of the invention, interference between two systems may be achieved by encoding the infrared signals, so that any signals emitted from a given remote control will be operative to control functions of a predetermined headset only.

As will further be appreciated from the description below, in contradistinction to prior art personal radio systems, control of all functions of the present system is provided by different combinations of a minimum number of keys, preferably no more than two.

Throughout the present specification and claims, the term "key" is intended to mean any type of push button, keypad, or any other element which, in response to being either pushed or touched, emits an electrical signal for the duration of the pushing or touching.

It will be appreciated that by use of a pair of keys, as described herein, the dexterity required for operation of the present system is no more than required to operate various functions on a digital wristwatch.

Referring now to Fig. 4, headset 10 is described. While the described components or sub-systems are shown as being located particularly in either earphone 14 or earphone 16, this is for exemplary purposes only, and, as described above, any suitable alternative arrangement may be adopted in place of that shown.

It is seen that, in the present embodiment, headset 10 has an IR receiver 22, which may be any suitable photodetector as used in state of the art IR remote control systems; and

a switched power source 26. Power source 26 is typically a pair of "AA" size 1.5 V batteries, although it may be any other suitable stored power source.

In response to detection of a suitable IR signal emitted by the remote control unit 12, as described below in conjunction with Fig. 5, IR receiver 22 provides an output signal to a controller 28, the signal being encoded so as to contain an operational command for a radio tuner 30, which is preferably at least a two band tuner, connected to controller 28. A suitable controller for use in the present system is the 68HC705P4 manufactured by Motorola, and a suitable tuner is the TEA5757 AM/FM tuner, manufactured by Phillips. Tuner 30 receives power from switched power source 26 via a step up circuit 32.

Controller 28 is operative to provide operating signals to radio tuner 30, thereby to govern band and frequency selection; output indications of the band and frequency being provided in the form of digital signals provided from tuner 30 to controller 28. Radio tuner 30 is operative to provide detected radio transmissions as audio output to a mixer circuit 34, from which the audio is provided to a volume control circuit 36, and from there, via an amplifier 38, to speakers 40 and 42.

As described above, the signal detected by IR receiver 22 is modulated so as to carry any of a number of selectable predetermined control signals, each of which is provided as output from IR receiver 22 to controller 28. These signals are decoded by the controller and are provided as command signals to radio tuner 30.

Controller 28 further operates a voice synthesizer circuit 44 to provide further audio outputs indicating user-initiated changes in the operational status of the headset. These audio outputs are provided from voice synthesizer circuit 44 to mixer circuit 34 which is operated by controller 28 so as to mix the audio output provided both from tuner 30 and from voice synthesizer circuit 44. The mixed audio output is provided, via volume control circuit 36 and amplifier 38, to speakers 40 and 42.

Referring now to Fig. 5, remote control unit 12 is operated preferably by depressing either of control keys "1" or "2", thereby to provide output signals. Different signals, provided by depressing the control keys in various combinations and for different time periods, drive an encoder 50 so as to activate a light emitting diode (LED) 52 via a suitable IR transmitter 54 so as to emit a predetermined plurality of IR signals. Each such signal, when detected by the IR receiver 22 (Fig. 4), is operative to cause a predetermined activation of the receiver headset 10, depending on its mode of operation prior to detecting the transmitted IR signal. The IR transmitter 54 and LED 52 are typically powered from a

suitable button cell 56, via a step up circuit 58. An auxiliary power source, such as a photovoltaic element, typically found in conjunction with pocket calculators, may also be used.

In accordance with a preferred embodiment of the invention, remote control unit 12 may be incorporated into a wristwatch unit, as illustrated in Fig. 1, or it may be an add-on unit, as shown and described above in conjunction with Figs. 2-3B. In Fig. 1 it is seen, by way of example, that keys 1 and 2 are provided as push keys 60 and 62 on a watch casing 64, such that a suitable press type action, such as by the index and middle fingers of the hand of a user, may be employed so as to engage the pair of keys simultaneously, as required. In Figs. 2 and 3A, a similar arrangement of push keys 260 and 262 is illustrated.

A change in the volume is generally perceived as being an increase or a decrease; similarly, a change in tuning is perceived as being an increase or decrease of frequency along a frequency scale. Accordingly, keys 1 and 2, in addition to their various combined functions, are assigned in Fig. 5 the respective functions of increase or increment, shown as "INC", and decrease or decrement, shown as "DEC".

As described above, in order to prevent "interference" between two or more personal radio systems located in close proximity to each other, it is desired to provide an IR transmission which is just strong enough to properly operate the headset worn by a first user, but which is not sufficiently strong to operate that worn by a second adjacent user, even if the remote control unit of the first user is aimed at the IR receiver of the second user's headset.

In order to limit the transmission, therefore, to a range of, for example, 60 cm - this being a suitable maximum range between the wrist-worn or hand-carried remote control unit and the IR detector of the headset when the remote control unit is aimed at the headset - the total radiant flux of an IR transmission having a frequency of, for example, 950 nm, is approximately 20 mW, wherein I_E = 150mA and t_p = 20ms.

Referring now to Fig. 6, there is provided, in accordance with an alternative embodiment of the invention, a fully integrated personal radio system in which a headset, referenced 110, includes both radio receiver apparatus and control apparatus therefor.

As will become apparent from the following description, the illustrated personal radio system permits complete functional operation based solely on the use of two manually operated keys, referenced 160 and 162, and aural indications, thereby not requiring removal of the headset from the head of a wearer in order to change waveband, seek and program

stations, adjust volume, and the like. Furthermore, as the unit does not require any form of visual display indicating user-initiated change in the status of various functions of the radio receiver, these being provided instead by aural indications, no light source - either internal or external of the system - is required, and the system is further completely suited for use by blind people as well as sighted people.

Headset 110 typically comprises a pair of earphones 114 and 116, each of which houses various portions of the integrated system. The earphones are connected to each other via any suitable resilient bridging member, shown schematically at 118. The illustrated distribution of the system components between the two earphones is for convenience only, and there may also be a headset in which the component distribution between the earphones is different from that illustrated, including one in which only a single earphone is provided, and which may be mounted onto the head of a user by means of a support member similar to bridging member 118.

Reference is now made to Fig. 7, which is a block diagram of the integrated system of the present embodiment. It will be appreciated that, while the described components or sub-systems are shown as being located particularly in either earphone 114 or earphone 116, this is for exemplary purposes only, and, as described above, any suitable alternative arrangement may be adopted in place of that shown.

It is seen that, in the present embodiment, keys 160 and 162 are mounted on the side of earphone 114, for example. There is provided a switched power source 126 which typically is a pair of "AA" size 1.5 V batteries, although it may be any other suitable stored, switched power source.

System 110 is operated by engaging control keys 160 and 162 in various predetermined combinations, thereby to provide corresponding output signals. Different signals, provided by depressing the control keys in various combinations and for different time periods, drive an encoder 150 which, via a controller 128, causes a predetermined activation of a radio tuner 130. Tuner 130 is preferably at least a two band tuner, connected to controller 128. A suitable controller for use in the present system is the 168HC705P4 manufactured by Motorola, and a suitable tuner is the TEA5757 AM/FM tuner, manufactured by Phillips. Tuner 130 receives power from switched power source 126 via a step up circuit 132.

Controller 128 is operative, as described, to provide operating signals to radio tuner 130, thereby to govern band and frequency selection, output indications of the band and

frequency being provided in the form of digital signals provided from tuner 130 to controller 128. Radio tuner 130 is operative to provide detected radio transmissions as audio output to a mixer circuit 134, from which the audio is provided to a volume control circuit 136, and from there, via an amplifier 138, to speakers 140 and 142.

Controller 128 further operates a voice synthesizer circuit 144 to provide further audio outputs indicating user-initiated changes in the operational status of the system. These audio outputs are provided from voice synthesizer circuit 144 to mixer circuit 134 which is operated by controller 128 so as to mix the audio output provided both from tuner 130 and from voice synthesizer circuit 144. The mixed audio output is provided, via volume control circuit 136 and amplifier 138, to speakers 140 and 142.

As mentioned briefly above in conjunction with systems 10 (Figs. 1-3) and 110 (Figs. 6 and 7), substantially all operations of the headset are controlled by depressing keys 1 and 2 in various predetermined, preprogrammed combinations. Examples of combinations which could be employed are detailed below in the APPENDIX. Many of these operations are accompanied by aural indications which are provided by a controller-driven voice synthesizer.

It will be appreciated that, in addition to those functions detailed in conjunction with the APPENDIX, further functions may be provided. Furthermore, functions similar to those detailed, but provided by different key combinations, may also be provided.

It will be appreciated that some of these aural indications indicate activation of a particular mode, such as ON/OFF, volume control, and various tuning modes, while others indicate various functions within these modes, including an indication of the frequency of preprogrammed and detected stations.

In accordance with a further embodiment of the invention, there may be an optional mode in which the receiver headset may be programmed to "announce" the name of selected radio stations in a predetermined geographical area when the tuned frequency corresponds to the frequency of those stations, rather than the frequency itself.

Referring now to Tables I-VI in the Appendix, there are described the various operational combinations of keys 1 (INC) and 2 (DEC) which serve to define a plurality of exemplary software functions. The aural indications provided in association therewith are also shown in the tables.

It will be appreciated that the modes, sub-modes and functions shown in tables I-VI are for example only, and that the same functions may be provided in different ways, or additional functions may be provided, to those represented therein.

Referring now to table I, it is seen that, in order to activate the headset receiver of the present invention any combination of the INC and DEC keys may be pressed for a short time period. Upon switching the system on, an aural indication as to the present waveband (AM or FM) and frequency or station to which the system is tuned is provided. Preferably, the last station to which the system was tuned prior to being switched off, is automatically recalled when the system is switched on again. In order to deactivate the headset, the INC and DEC keys must be pressed together for a long time period, thereby to avoid inadvertent deactivation of the headset.

It should be noted that the term "short" refers to a press duration of typically less than 1 second, and "long" refers to a press duration typically greater than 2 seconds.

After having activated the headset, as described, a user may seek to set the volume to an acceptable level.

Referring now to table II, after having activated the headset, a further short press on the INC & DEC keys together, initiates the "volume" mode, after which an aural indication *"volume"* is provided. The starting volume is typically a median value, which may be either increased or decreased, as desired, by engaging either the INC key, to increase, or the DEC key to decrease. A particular volume level may be selected at any time by a further short press on either the INC key or the DEC key, without regard to whether the volume had been increasing or decreasing.

Once the volume level has been set, the headset may be set to enter the "scan" mode, shown in table III, which enables selecting a waveband and scanning it for a station which the user may wish to store. In order to initiate this mode, the INC and DEC keys are pressed together for a short time, after which an aural indication *"scan"* is provided.

Subsequently pushing the INC key for a long period causes the waveband to switch from AM to FM or vice-versa, after which an aural indication "*AM*" or "*FM*" is received. A short push on either the INC or DEC keys causes a corresponding change in the tuned frequency. After locating a station, the system stops scanning, enables the user to hear the station for a period, for example, of two seconds, after which an aural indication as to the waveband and frequency is provided.

Subsequently, as shown in table IV, a long depression of the DEC key causes initiation of the "write" sub-mode, indicated aurally by the message *"write station"*, in which a further short depression of the INC key causes the station to be stored; storing of the station is indicated by the message *"station stored"*.

In the event that one or more stations have already been preprogrammed in the headset, it is possible to search for them by performing the same initial steps as in the "scan" mode, as shown in table V. However, when a preprogrammed station is found as the tuner scans the selected waveband by the user having pressed for a short time on either the INC or DEC key, the tuner will stop for a few seconds at the preprogrammed station and announce the frequency, such as *"one four oh four"* or *"nine-five point five"*. Alternatively, if the personal radio system of the present invention is due to be used in a region in which various stations are known by name or title, instead of announcing the frequency, the name or title of a station at a given frequency may be announced, such as *"channel one"* or *"station a-b-c"*. The encoder may also be configured to provide an option of selecting either of these, as desired.

In order to stop at a desired preprogrammed station, either the INC or DEC keys may be pressed for a short time.

Finally, as shown in table VI, in the "select" mode, preprogrammed stations may be deleted from the headset memory by first, pressing on DEC for a long time, after which the aural announcement *"delete n"* will be heard and, second, by pressing for a short time on INC, after which the message *"station deleted"* will be heard, confirming deletion of the station.

It should be noted that the combination of INC and DEC together for a short time causes initiation of the volume, scan and select modes. Accordingly, after depressing INC and DEC as described, a user will hear the mode announced, as described above, and can proceed to perform steps in that mode. Alternatively, in order to scroll to another mode, he can press the same key combination and, upon hearing the mode announced, will either decide to enter that mode or to proceed to the next mode.

It will be appreciated by persons skilled in the art that the present invention is not limited by what has been shown and described hereinabove, merely by way of example. Rather, the scope of the present invention is limited solely by the claims, which follow.

A switch 24 on the headset 10 of Figure 1 can be used to disconnect the headset-mounted system from its power source, which is beneficial if the system is not in use.

APPENDIX

TABLE I

MODE: POWER			
FUNCTION	PRESS	PRESS DURATION	AURAL INDICATION
ON	INC, DEC, OR INC & DEC	SHORT	"*AM*" OR "*FM*" AND "*N*" (FREQUENCY OR NAME OF STATION)
OFF	INC & DEC	LONG	NONE

TABLE II

MODE: VOLUME			
FUNCTION	PRESS	PRESS DURATION	AURAL INDICATION
INITIATE MODE	INC & DEC	SHORT	"*VOLUME*"
DECREASE	DEC	SHORT	NONE
STOP DECREASE	INC OR DEC	SHORT	NONE
INCREASE	INC	SHORT	NONE
STOP INCREASE	INC OR DEC	SHORT	NONE

TABLE III

MODE: SCAN			
FUNCTION	PRESS	PRESS DURATION	AURAL INDICATION
INITIATE MODE	INC & DEC	SHORT	"*SCAN*"
ENTER "CHANGE WAVEBAND SUB-MODE"	INC	LONG	"*AM*" OR "*FM*"
SEARCH UPWARD FOR STATION	INC	SHORT	after 2 seconds: "*AM*" OR "*FM*" AND "*N*" (FREQUENCY OR NAME OF STATION)
SEARCH DOWNWARD FOR STATION	DEC	SHORT	after 2 seconds: "*AM*" OR "*FM*" AND "*N*" (FREQUENCY OR NAME OF STATION)

TABLE IV

MODE: WRITE (SUB MODE OF SCAN)			
FUNCTION	PRESS	PRESS DURATION	AURAL INDICATION
INITIATE SUB-MODE	DEC	LONG	*"WRITE STATION"*
STORE STATION	INC	SHORT	*"STATION STORED"*

TABLE V

MODE: SELECT			
FUNCTION	PRESS	PRESS DURATION	AURAL INDICATION
SELECT PROGRAMMED STATION	INC & DEC	SHORT	*"SELECT" PROGRAMMED STATION"*
SELECT WAVEBAND	INC	LONG	*"AM"* OR *"FM"* AND *"N"* (FREQUENCY OR NAME OF STATION)
SEARCH UPWARD FOR STATION	INC	SHORT	*"AM"* OR *"FM"* AND *"N"* (FREQUENCY OR NAME OF STATION)
SEARCH DOWNWARD FOR STATION	DEC	SHORT	*"AM"* OR *"FM"* AND *"N"* (FREQUENCY OR NAME OF STATION)
STOP SEARCH AT DESIRED STATION	INC OR DEC	SHORT	*"AM"* OR *"FM"* AND *"N"* (FREQUENCY OR NAME OF STATION)

TABLE VI

MODE: DELETE (SUB-MODE OF SELECT)			
FUNCTION	PRESS	PRESS DURATION	AURAL INDICATION
INITIATE SUB-MODE	DEC	LONG	*"DELETE N"*
DELETE PROGRAMMED STATION	INC	SHORT	*"STATION DELETED"*

CLAIMS

1. A personal radio system comprising:

remote controlled headset means for receiving radio transmissions and for providing audio output corresponding to the radio transmissions to a user; and

a remote control unit operated by the user for operating said headset means from no more than a predetermined distance, thereby to prevent interference between said remote control unit and an additional remote controlled headset means associated with an additional user.

2. A system according to claim 1, wherein said remote control unit comprises signal transmission means for transmitting operating signals to said headset means from no more than a predetermined maximum transmission range, thereby to prevent interference between said remote control unit and an additional remote controlled headset means associated with an additional user.

3. A system according to claim 1, wherein said headset means comprises:

means for detecting radio transmissions and for converting said transmissions into audio output; and

means for providing said audio output to the user.

4. A system according to claim 3, wherein said remote control unit further comprises means for manually selecting predetermined operational functions of said headset means, and said operating signals correspond to the selected operational functions,

and wherein

said headset means further comprises means for detecting said operating signals, and for operating said headset means in accordance therewith.

5. A system according to claim 4, wherein said signal transmission means comprises IR transmission means, and said means for detecting said operating signals comprises IR detection means.

6. A system according to claim 4, wherein said means for manually selecting comprises:

key means, having no more than a predetermined number of keys, which are engageable in any of a plurality of combinations for any of a plurality of time durations so as to provide a corresponding plurality of signal outputs; and

encoding means, associated with said key means, comprising means for receiving said signal outputs and for operating said signal transmission means to provide said operating signals in accordance with said signal outputs.

7. A system according to claim 6, wherein said key means comprises a pair of keys.

8. A system according to claim 7, wherein said headset means also comprises means for providing aural indications to the user, indicative of the status of any of a predetermined plurality of user-initiated functions of said headset means.

9. A system according to claim 8, wherein said headset means comprises:

radio tuning means, and

volume control means associated with said radio tuning means,

and wherein said means for detecting said command signals comprises:

signal detector means, and

control means,

and wherein said signal detector means is operative to receive said operating signals and to provide them to said control means, and said control means is operative to operate said radio tuning means, said volume control means, and said means for providing aural indications in accordance with said command signals.

10. A system according to claim 1, wherein said remote control unit is configured for mounting onto a wrist of the user.

11. A system according to claim 10, wherein said remote control unit is further incorporated into a wristwatch unit.

12. A system according to claim 1, also comprising means for attaching said remote control unit to a selected object, so as to carried therewith.

13. A system according to claim 12, wherein said means for attaching comprises means for attaching said remote control unit in association with a wristwatch strap.

14. A personal radio system comprising:

radio tuner means for detecting radio transmissions and for converting said transmissions into audio output;

audio means for providing said audio output to a user;

aural means for providing aural indications as to user-initiated changes in the operational status of at least said radio tuner means;

controller means for operating said radio tuner means, said audio means and said aural means; and

operating means for providing control signals to said controller means for operation of said tuner means, said audio means and said aural means.

15. A system according to claim 14, wherein said operating means comprises:

key-operated means for manually selecting predetermined operational functions of said tuner means, said audio means and said aural means, and for providing said control signals, corresponding to said selected operational functions, to said controller means.

16. A system according to claim 15, wherein said key-operated means comprises:

no more than a predetermined number of manually operable keys for producing a plurality of predetermined output signals; and

encoder means for receiving said output signals and for providing said control signals to said controller means.

17. A system according to 16, wherein said predetermined number of keys is two.

18. A system according to claim 16, wherein said keys are engageable in any of a plurality of selectable predetermined combinations for any of a plurality of selectable predetermined time durations so as to provide a corresponding predetermined plurality of signal outputs, corresponding to a plurality of selectable, predetermined control signals.

19. A system according to claim 16, and having a support for said tuner means, said audio means, said aural means and said controller means, wherein said support is configured as a headset for mounting onto the head of a user.

20. A system according to claim 18, wherein said key-operated means is also mounted onto said headset means, so as to be operable without requiring removal of the headset from the head of the user.

21. A system according to claim 18, and further comprising a remote control unit comprising signal transmission means, wherein said key-operated means is mounted onto said remote control unit in operative association with said signal transmission means, and wherein said headset configured support further comprises signal detection means, mounted in operative association with said controller means, for detecting signals from said signal transmission means.

The Patent Office

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Application No: GB 9621883.9 **Examiner:** Mike Davis
Claims searched: 1-13 **Date of search:** 24 January 1997

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Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): G4H (HRCE,HRCS), H3Q (QAH)

Int Cl (Ed.6): H03J

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
	None	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.